CONSTRUCTION MATERIALS
Research Brief

Sustainable Industry Classification System™ (SICS™) #NR0401
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SASB’s Industry Brief provides evidence for the material sustainability issues in the industry. The brief opens with a summary of the industry, including relevant legislative and regulatory trends and sustainability risks and opportunities. Following this, evidence for each material sustainability issue (in the categories of Environment, Social Capital, Human Capital, Business Model and Innovation, and Leadership and Governance) is presented. SASB’s Industry Brief can be used to understand the data underlying SASB Sustainability Accounting Standards. For accounting metrics and disclosure guidance, please see SASB’s Sustainability Accounting Standards. For information about the legal basis for SASB and SASB’s standards development process, please see the Conceptual Framework.

SASB identifies the minimum set of sustainability issues likely to be material for companies within a given industry. However, the final determination of materiality is the onus of the company.

Related Documents

- [Non-Renewable Resources Sustainability Accounting Standards](#)
- [Industry Working Group Participants](#)
- [SASB Conceptual Framework](#)

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Construction materials are an essential input to the development of the commercial, residential, transportation, and industrial infrastructure that drives economic growth. These materials will continue to play an important role in global economic development in the future, both in developed and emerging countries. Much of the economic growth in emerging markets today is accompanied by an expansion in construction activity, especially of industrial and transportation infrastructure, which in turn requires greater production of construction materials.

However, with the emergence of new global threats such as climate change, water scarcity, and resource constraints, and greater public concern about the environmental and health impacts of resource extraction activities and industrial production, regulatory action and business needs around companies’ sustainability performance are intensifying around the world. Given the resource-intensity of industries involved in extractive activities, and their potential wide-ranging environmental and social externalities, this sector has been the focus of regulation and public attention.

The Construction Materials industry is being challenged by regulators, customers, and the general public to innovate and develop more durable, safe, sustainably-sourced, and energy-efficient products, as well as practice more resource-efficient production activities.

Therefore, management (or mismanagement) of material sustainability issues has the potential to affect company valuation through impacts on profits, assets, liabilities, and cost of capital.

Investors would obtain a more holistic and comparable view of performance with construction materials companies reporting metrics on the material sustainability risks and oppor-
tunities that could affect value in the near- and long-term in their regulatory filings. This would include both positive and negative externalities, and the non-financial forms of capital that the firms in this industry rely on for value creation.

Specifically, performance on the following sustainability issues will drive competitiveness within the Construction Materials industry:

- Reducing direct greenhouse gas (GHG) emissions from operations;
- Reducing air pollution that can create hazards for human health and the environment;
- Managing the efficiency and sourcing of energy used in operations;
- Securing water supplies without exacerbating local water system stresses;
- Reducing and managing hazardous and solid waste generated during operations;
- Mitigating the biodiversity impacts of raw material extraction activities;
- Ensuring worker health and safety and promoting a strong safety culture;
- Developing innovative solutions to reduce the lifecycle impacts of their products; and
- Ensuring transparency in product pricing, and avoiding direct or indirect market manipulation.

INDUSTRY SUMMARY

The Construction Materials industry includes companies that mine, process, and produce materials including cement and its aggregates, ready-mix concrete, asphalt, sand, gravel, and other construction products used in buildings, such as glass, plasterboard, insulation, bricks, and roofing materials, among others. Materials producers operate their own quarries, mining crushed stone or sand and gravel. They may also purchase raw materials from the mining and petroleum industries.¹

Publicly-traded companies in the Construction Materials industry generated approximately $500 billion in revenues globally in 2013, around 58 percent of which were generated from sales from the Cement and Aggregates segment.¹ The top five global companies in this segment account for almost 17 percent of industry revenue and 30 percent of revenues within the segment.² Glass Products Manufacturing is the second largest segment with $61 billion in revenues, followed by Concrete Product manufacturers with $45 billion.³

Production volumes tend to reflect economic activity broadly as demand is influenced by private sector construction, as well as government infrastructure investment. The majority of growth in the cement segment comes from

¹ Industry composition is based on the mapping of the Sustainable Industry Classification System (SICS™) to the Bloomberg Industry Classification System (BICS). A list of representative companies appears in Appendix I. Companies producing wood-building products are included in the Forestry and Paper industry under SICS and are not considered here.
emerging markets, particularly from China and India. Overall, emerging markets account for approximately 90 percent of the global cement consumption. In 2011, three out of the top five companies ranked by their capacity were based in Europe, and the remaining two were based in China. The top three companies, including Lafarge (France), Holcim (Switzerland), and CNBM (China) had an annual capacity of more than 200 million metric tons (Mt) in 2011 and accounted for 33 percent of the total capacity of the 20 largest global cement producers.

Key U.S.-domiciled companies in this segment include Vulcan Materials, MDU Resources Group, and Martin Marietta Materials. However, the biggest U.S. companies in the Construction Materials industry are actually involved in other production segments. These include: Owens Corning, a manufacturer of roofing, flat glass, and insulation products, and USG Corporation, a gypsum product manufacturer.

The industry is in the early stages of global consolidation since quarrying raw materials requires large tracts of land and regulation is beginning to restrict the development of new lands. Companies with extractive operations must obtain mining permits and establish proven reserves in order to secure materials for future production. In some countries, permits for raw material extraction are allotted for a limited time due to growing environmental pressure. Limits on permit duration can affect the amount of proven reserves. Quarrying is typically conducted in an open-pit fashion, which demands many acres of land. Quarrying also requires blasting of rock and heavy machinery, including large trucks, excavators, and stone-crushing machines. Since construction materials are expensive to transport due to their weight, most companies have operations in proximity to primary markets. The location of plants plays a key role in company competitiveness.

Aggregates, such as sand and gravel, are the most-used material in the world after water, with over 25 billion tons consumed. Construction materials producers generally operate their own quarries or purchase raw materials from the mining and petroleum industries, and sell largely to construction firms. The industry is characterized by high capital investment due to the use of heavy machinery, high energy costs, and use of large tracts of land.

The Construction Materials industry is resource- and energy-intensive, and raw materials and energy costs account for a considerable share of expenses. Many industry processes, such as glass, brick, and cement manufacturing require high-temperature firing in kilns to induce chemical changes in raw material inputs, such as limestone and silica. In cement production, limestone is blended with silica, alumina, and iron ore and baked in a large rotating kiln at 1500 degrees Celsius to create a substance called “clinker”. Clinker pellets are ground with gypsum to make cement powder. Energy inputs comprise roughly 33 percent of the cost of cement production, while raw materials are 29 percent, labor 26 percent, and depreciation 12 percent.

Important megatrends affecting the Construction Materials industry include the Green Building movement. The adoption of green building codes and standards, such as the U.S.
Green Building Council’s (USGBC) Leadership in Energy and Environmental Design (LEED) rating system, encourages the design and construction of buildings that are environmentally friendly, as well as safer for their occupants. This driver, combined with more demanding customer preferences for products that assist in obtaining LEED credit, has increased demand for products, systems, and services that contribute to building sustainable spaces. The industry expects ongoing growth in demand over time for products that meet regulatory and customer sustainability standards, with some estimates reporting that the industry for green building materials could reach $254 billion by 2020.8

**LEGALISITIVE AND REGULATORY TRENDS IN THE CONSTRUCTION MATERIALS INDUSTRY**

Companies in the Construction Materials industry operate under a range of federal, state, and local regulations related to environmental performance and worker health and safety. Environmental laws and regulations are evolving and becoming more stringent globally in the context of increasing resource constraints, greater urbanization, global challenges, such as climate change, and greater public awareness. The following section provides a brief summary of key regulations and legislative efforts related to this industry.9

There are a number of key pieces of legislation in the U.S. with the potential to impact company value in the Construction Materials industry. They include: the Clean Water Act (CWA); Clean Air Act (CAA); Resource Conservation and Recovery Act (RCRA); Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); and the Surface Mining Control and Reclamation Act (SMCRA). The industry is also subject to regulations by the Mine Safety and Health Administration (MSHA) and the Occupational Safety and Health Administration (OSHA).9

The CAA requires the U.S. Environmental Protection Agency (EPA) to establish national ambient air quality standards for certain common and widespread pollutants. In the context of the Construction Materials industry, recent actions include the following: in 2013, the EPA issued a revised version of the final Portland Cement National Emissions Standards for Hazardous Air Pollutants (NESHAP) to reduce mercury and other air emissions, setting a compliance deadline by 2015.10 Similarly, in 2004, the EPA registered the NESHAP for Lime Manufacturing Plants, which subjected the lime manufacturing industry to Maximum Achievable Control Technology (MACT) standards.11 Particular segments in the Construction Materials industry are also subject to New Source Performance Standards (NSPS). These standards apply to new, modified, and reconstructed affected facilities in specific source categories, which include, among others, glass and cement manufacturers. All these rules cover emissions of compounds, such as sulfur and nitrogen oxides, mercury, hydrogen chloride, and various hydrocarbons.12

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8 This section does not purport to contain a comprehensive review of all regulations related to this industry, but is intended to highlight some ways in which regulatory trends are impacting the industry.
Furthermore, the EPA requires reporting of GHG emissions from large emissions sources in the U.S. under its Greenhouse Gas Reporting Program (GHGRP). The GHGRP includes reporting by 41 source categories, including cement and glass production, and lime manufacturing.\textsuperscript{13}

In some regions of the world, existing regulations to reduce GHG emissions are becoming more stringent. The European Union (E.U.)’s Emission Trading System (ETS) is a GHG emissions cap-and-trade system designed to gradually reduce total GHG emissions in the 28 E.U. member states. The target is to reduce emissions by 21 percent from 2005 levels by 2020. The ETS today covers approximately 45 percent of total E.U. GHG emissions. In 2009, emissions allowances began to be auctioned instead of allocated for free, in order to encourage carbon price stability.\textsuperscript{14} In 2013, 40 percent of allowances were to be auctioned. Over time, it is predicted that prices for allowances will increase, further compelling companies to reduce emissions. The scope of the ETS includes facilities from the Construction Materials industry. International offset credits are still available under the E.U.’s ETS, but they cannot account for more than 50 percent of GHG reduction efforts from 2008 to 2020.\textsuperscript{15}

The RCRA governs solid and hazardous waste treatment, storage, and disposal, while CERCLA provisions can hold companies responsible for remediation of hazardous substances.\textsuperscript{16} In the context of construction materials companies, the EPA has been evaluating the regulatory status of cement kiln dust (CKD). In 1999, the agency proposed to treat CKD as a non-hazardous waste. In 2002, the agency issued a notice that instead proposed CKD management standards as a RCRA Subtitle D (solid waste) rule. It proposed temporarily suspending the proposed RCRA Subtitle C (hazardous waste) portion of the proposed rule for three to five years to assess how CKD management practices and state regulatory programs evolve. However, as of June 2014, it had not finalized this proposal.\textsuperscript{17}

The SMCRA, administered by the Office of Surface Mining Reclamation and Enforcement (OSM), establishes mining, environmental protection, and reclamation standards for surface and underground mining. Mining companies are required to gain permits from the OSM before proceeding with new projects.

As described in the Industry Summary section, the Construction Materials industry’s growth is being driven by demand from emerging countries, such as China and India. Incidentally, a significant competitive advantage for companies that operate in emerging markets has been generally less strict environmental standards. However, as environmental and social impacts become apparent and public concerns increase in such countries, industries are likely to face higher compliance costs and stricter enforcement of regulations. For example, in China, public outcry over air pollution led the government to reopen the amendment process in 2013 for its national Air Pollution Preven-
tion and Control Law, which had not been amended since 2000.\textsuperscript{18} China has also introduced GHG emissions trading pilot programs in several regions since 2013. The Construction Materials industry will likely be impacted by these new programs.

In addition to environmental regulations, the industry is also subject to those governing health and safety, and corporate governance issues. The health and safety regulations fall within the Federal Mine Safety & Health Act and are enforced by the MSHA, a division of the U.S. Department of Labor. The Act covers mandatory safety standards regarding dust, access to appropriate respiratory equipment, noise standards and protection, treatment of combustible materials, use of electrical equipment and cabling, use of blasting and explosives, emergency shelters, and communications. The MSHA’s agenda is to educate mine operators and employees about both the relevant aspects of mine safety and the regulatory compliance requirements.\textsuperscript{19}

Finally, companies in this industry are also regulated by antitrust agencies in several jurisdictions.

**SUSTAINABILITY-RELATED RISKS & OPPORTUNITIES**

Industry drivers and recent regulations suggest that while traditional value drivers will continue to impact financial performance, intangible assets such as environmental and social capitals, company leadership and governance, and the company’s ability to innovate to address environmental and social issues are likely to contribute increasingly to financial and business value.

Broad industry trends and characteristics are driving the importance of sustainability performance in the Construction Materials industry, including:

- **Resource intensity and use of common capitals:** Construction materials companies use large amounts of natural capital inputs, such as energy, water, limestone, and gypsum, among other inputs in their production process. Resource efficiency can help avoid higher costs or unstable supply of these inputs due to environmental pressures, such as climate change and water scarcity. Furthermore, human capital continues to be important for the industry. A strong safety culture can help mitigate and manage the workplace dangers characteristic of heavy industry manufacturing, which can affect worker health and safety.

- **Negative externalities:** The production of construction materials creates negative environmental externalities, such as GHG emissions, and air and water pollution, and can harm human health. Increasingly stringent environmental regulations have the potential to increase operating costs and affect the profitability of companies seen as contributing to these externalities.

- **Social license to operate:** Construction materials companies, in particular those with raw material extractive activities, depend on
support from employees and local communities to engage in operations that can be harmful to human health and the environment. Negative impacts, or negative public perceptions of such companies, therefore, may disrupt or destroy their social license to operate.

- **Continuous innovation**: Recent trends in the establishment of green building codes and the construction of energy-efficient buildings have accelerated innovation in the Construction Materials industry. Continued environmental and social pressures on profitability require companies to mitigate the lifecycle impacts of their products through innovative technologies and increased research and development efforts.

As described above, the regulatory and legislative environment surrounding the Construction Materials industry emphasizes the importance of sustainability management and performance. Specifically, recent trends suggest a regulatory emphasis on the reduction of environmental and human health impacts, which will serve to align the interests of society with those of investors.

The following section provides a brief description of each sustainability issue that is likely to have material implications for companies in the Construction Materials industry. Included in the description is an explanation of how the issue could impact valuation and evidence of actual financial impact. Further information on the nature of the value impact, based on SASB’s research and analysis, is provided in Appendix IIA and IIB. Appendix IIA also provides a summary of the evidence of investor interest in the issues. This is based on a systematic analysis of companies’ 10-K and 20-F filings, shareholder resolutions, and other public documents, as well as the results of consultation with experts participating in an industry working group convened by SASB.

A summary of the recommended disclosure framework and accounting metrics appears in Appendix III. The complete SASB standards for the industry, including technical protocols, can be downloaded from www.sasb.org. Finally, Appendix IV provides an analysis of the quality of current disclosure on these issues in SEC filings by the top companies in the industry.

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**ENVIRONMENT**

The environmental dimension of sustainability includes a company’s impact on the environment, either through the use of non-renewable natural resources as the factors of production (e.g., water, energy, minerals), or through environmental externalities or other harmful releases in the environment, such as air and water pollution, waste disposal, and greenhouse gas emissions.

The Construction Materials industry relies on a steady stream of raw materials from the mining and petroleum industries as well as on high
water and energy requirements. Moreover, companies involved in quarrying operations also rely heavily on resources extracted directly from the natural environment. While technical improvements have reduced the environmental impacts from the industry in recent years, overall industry output is growing rapidly, driven by demand from emerging markets; plus construction material production and manufacturing remains a resource-intensive activity relative to other industries.

Greenhouse Gas Emissions

GHG emissions are a source of regulatory risk for companies, which arises from current and potential future regulations in the U.S. and abroad. The production of construction materials generates relatively large quantities of greenhouse gases, including carbon dioxide (CO$_2$), nitrous oxides (N$_2$O), and methane (CH$_4$).

Direct GHG emissions from cement production occur as a result of production processes as well as on-site combustion of fossil fuels. Process emissions of CO$_2$ occur when limestone is heated within the kiln, through a process known as “calcination.” Combustion emissions materialize with the burning of fossil fuels, such as coal, natural gas or oil, to heat the kiln. Emissions from calcination account for 50 percent of all emissions from cement production, while the use of fossil fuels accounts for an additional 40 percent. Transportation equipment used in mining operations and the transportation of raw and finished materials account for the rest.

Emissions from glass manufacturing are also primarily a result of fuel combustion. Glass-melting furnaces require significant amounts of energy to heat and melt the raw materials to form molten glass. This energy is usually generated through the combustion of natural gas, although other fuels may be used as a back-up. Glass manufacturing facilities may also operate other stationary combustion sources, all of which emit GHGs.

Companies that cost-effectively reduce GHG emissions from their operations by implementing industry-leading technologies and processes can create operational efficiency. They can mitigate the effect of increased fuel costs and regulations that limit — or put a put a price on — carbon emissions.

Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Global Scope 1 emissions, percentage covered under a regulatory program; and
- Long- and short-term strategy to manage Scope 1 emissions.

Evidence

The cement and aggregates segment alone accounts for 5 percent of total global CO$_2$ emissions. It is estimated that, on average, producing a ton of cement releases approximately 1,700 pounds of CO$_2$ into the atmosphere. Cement manufacturers have made considerable progress in reducing the carbon footprint per ton of output over the last decade, with
CO₂ emissions per ton of product falling by 17 percent since 1990.\textsuperscript{24} However, in absolute terms, and driven by an increase of 74 percent in production volumes, CO₂ emissions from this segment have increased by 44 percent over the same period.\textsuperscript{25}

In the U.S., cement and lime production accounted for 48.4 million metric tons of CO₂ equivalent in 2012.\textsuperscript{26} To put this figure in context, this number represents the 8th highest source of emission after fossil fuel combustion (which includes electricity generation, transportation, industrial, residential and commercial), non-energy use of fossil fuels, and iron and steel production and metallurgical coke production. Long-term economic growth and demand for construction materials have led to an increase of emissions from cement production in the U.S. of 5.3 percent from 1990 to 2012, an increase of 1.8 Tg CO₂ equivalent.\textsuperscript{27}

Total U.S. emissions from glass manufacturing activities were estimated to be 4,425,269 mt of CO₂ equivalent in 2004. These emissions include both process-related emissions (resulting in the release of CO₂) and on-site stationary combustion emissions (resulting in CO₂, CH₄, and N₂O emissions). The former accounted for 37 percent of the total, while the latter accounted for the rest.\textsuperscript{28}

The World Business Council for Sustainable Development’s (WBCSD) Cement Sustainability Initiative (CSI) is a global effort by 24 major cement producers to pursue sustainable development of the industry, with a focus on GHG emissions. The Initiative participants together produce nearly 30 percent of global cement.\textsuperscript{29} The CSI has identified four major avenues for carbon emissions reduction: energy efficiency, alternative fuels, carbon sequestration, and clinker substitution. As mentioned earlier, the biggest share of the GHG emissions in cement manufacturing comes from the chemical reactions when raw materials are heated in the kilns. These emissions can be captured but cannot be decreased at source, so cement manufacturers’ strategies aimed at CO₂ reduction are mainly geared towards energy efficiency and the use of alternative fuels.\textsuperscript{30}

Examples of companies managing GHG emissions in this industry are plentiful. For example, CEMEX, a Mexican-based firm, has been working to reduce overall GHG emissions by increasing use of renewable energy and biomass to fuel its clinker kilns, as well as exploring technologies to capture and recycle carbon dioxide. Eighteen percent of the company’s electricity came from renewable sources in 2010. The company benefits directly by generating carbon reduction credits which it can then use to offset emissions at other company facilities.\textsuperscript{31} Ireland-based CRH reduced its total gross CO₂ emissions from 13.31 million tons in 2008 to 8.85 million tons in 2012, and its carbon intensity from 738 to 637 kg per ton of product over the same period of time.\textsuperscript{32} This was achieved through increased use of alterna-
tive fuels and materials, such as high efficiency lime kilns, sustained investment in energy efficient processes and abatement systems, as well as product innovation aimed at lowering their carbon intensity, CRH also increased the use of alternative fuels at its cement plants by 30 percent and in the process the company saved € 25 million euro in 2012.33

Construction materials companies are aware of the materiality of GHG emissions as many firms already recognize climate change legislation as a risk factor in their SEC annual filings. For example, Martin Marietta Materials, an aggregates producer, mentions in its FY 2013 Form 10-K that climate change legislation may adversely impact their business via increased operating costs or taxes. The company also recognizes that some of its products “compete against other products that emit a lower level of GHGs in their production. Therefore, [their facility] may be required to absorb additional costs due to the regulation of GHG emissions in order to remain competitive in pricing in that market.”34 Texas industries, a ready mix concrete producer, also recognizes potential impacts via energy costs that will increase due to the impact of these regulations on the electric utility industry. Finally, USG Corp, a company that manufacturers gypsum and insulation products, informs its shareholders on negative potential impacts, among other things, on their capital expenditures: “stricter regulation of emissions might require us to install emissions controls or other equipment at some or all of our manufacturing facilities, requiring significant additional capital investments.”35

Value Impact

Managing GHG emissions can provide operational efficiency and affect the cost structure of companies in the industry, with a direct, ongoing impact on value. Companies can benefit from reductions in energy costs, which are a significant proportion of their operating expenses.

GHG emissions caps or other regulatory restrictions on emissions could pose a long-term threat to the industry. Such regulations could result in increased, potentially unanticipated capital expenditures and permitting costs if companies are required to modify their facilities, affecting cash flows. Delays in permitting can disrupt production, or companies could be forced to curb production, which would lower revenues. A price on carbon emissions could increase operating expenditures. Furthermore, companies could also face fines if GHG emissions rules are violated, affecting one-time costs.

Increased operating risks due to the relative magnitude of emissions from the industry and regulatory risks could create uncertainty about the revenue growth and cost structure of companies, leading to a higher cost of capital.

While regulatory development in this area is an inherently slow and politically-charged process whose exact outcome is nearly impossible to predict, increasingly stringent GHG regulations will be needed in different regions in order to address climate change targets. The probability and magnitude of these impacts are therefore likely to increase in the future.
Air Quality

Emissions of air pollutants is a material concern to construction materials companies as regulations surrounding these emissions can directly impact revenues through production limitations, and affect costs through mandatory use of emissions-reduction equipment. However, impacts on companies will vary depending on the specific location of operations and the prevailing air emissions regulations, which may be less developed in some regions and countries than in others.

On-site fuel combustion and production processes in the Construction Materials industry emit criteria air pollutants and toxic chemicals, including small quantities of organic compounds and heavy metals. Some emissions of particular concern are those of mercury, nitrogen oxides, sulfur dioxides, and particulate matter. These air emissions can have significant, localized human health and environmental impacts. The EPA regulates these pollutants under the Clean Air Act.36

In the cement and aggregates segment, air emissions from the kiln system are the primary concern; fuel combustion, the process of making clinker and crushing and grinding operations have been identified by the EPA as the major processes that cause air emissions.

Companies face regulatory compliance costs, and higher operating and capital expenditures for technological and process improvements to keep emissions under control. Active management of facility emissions through implementation of industry best practices across global operations can facilitate the transition to sustainable production, lowering costs and potentially enhancing operational efficiency.

Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Air emissions from industry-specific pollutants.

Evidence

Air emissions regulation is rapidly expanding as developing nations contribute more volumes of pollutants each year. For example, the EPA and the UN Environmental Programme are currently working on regulations that would limit the amount of substances, such as mercury and chlorine and particulate emissions. The latest NSPS and NESHAP regulations cap cement plant mercury emissions at 21 pounds per million tons of cement produced. The EPA predicts that the rules will cut mercury emissions by up to 92 percent, as well as reduce particulate matter by 92 percent and sulfur dioxide by 78 percent. This could mean a savings of $7 to $19 in public health benefits for every dollar in costs.37

According to data from the EPA’s 2008 National Emissions Inventory (NEI), the cement manufacturing segment accounted for ap-
proximately 4.6 thousand pounds of mercury emissions, which is more than 39 percent of the total emissions from industrial processes; almost 75 thousand tons of NO\textsubscript{x} (28 percent of the industrial emissions); and more than 20 thousand tons of SO\textsubscript{2}, or 6.9 percent of the total industrial emissions.\textsuperscript{38}

Companies in the Construction Materials industry are cognizant of the potential risks stemming from air emissions mismanagement and have achieved significant reductions over the past decades. For example, CEMEX reduced its mercury emissions by shutting cement kiln dust from the kiln system to finish grinding and injecting activated carbon into kiln exhaust gases. Overall, from 2005 to 2013 the company achieved 59.1 percent reduction of dust-specific emissions, 21.2 percent of NO\textsubscript{x}-specific emissions, and 58.6 percent of SO\textsubscript{x}-specific emissions.\textsuperscript{39} Similarly, faced with increasingly stringent air emission standards, Lafarge was able to reduce NO\textsubscript{x} emissions by more than half with the introduction of new technology in one of its Romanian plants.\textsuperscript{40}

Failing to meet air pollution regulations can be costly for companies in the industry. In 2013, for example, the EPA fined Ash Grove Cement $2.5 million for allegedly violating the CAA by emitting excessive amounts of nitrogen oxides and sulfur dioxide into the atmosphere. As a result of the penalty, the company agreed to invest $30 million in pollution control equipment, as well as $750,000 to mitigate the excess emissions from other facilities.\textsuperscript{41} As another example, in 2011 the EPA imposed a $1.4 million fine on CEMEX for CAA violations at its cement plant in Fairborn, Ohio. The company was required to spend $2 million on measures to reduce its NO\textsubscript{x} and SO\textsubscript{2} emissions.

**Value Impact**

Managing air emissions can provide operational efficiency and affect the cost structure of companies in the industry, with a direct, ongoing impact on value.

Air pollution may result in regulatory penalties, higher regulatory compliance costs, or new capital expenditures to upgrade equipment. While the timeline for regulatory compliance is partly designed to allow companies to reallocate resources to cover the costs, companies are nonetheless likely to face higher ongoing operating costs. Companies could face one-off impacts on cash flows and liabilities as a result of fines. There may be legal challenges from the local population or businesses that are directly affected by air pollutants, also resulting in liabilities. Companies could face delays in obtaining permits if they do not meet state or local emissions limits, which could impact production, and therefore, revenues. Production could also be affected due to unscheduled downtime from incidents resulting in emissions of harmful pollutants.

Active management of the issue – through technological and process improvements – could allow companies to limit the impact of regulations and benefit from operational efficiencies that could lead to a lower cost structure over time.

Public concern and regulatory action on improving air quality is increasing globally. As a result, the probability and magnitude of impact on financial results is likely to increase in the near-term.
Energy Management

Despite gains in energy efficiency in recent years, the production of construction materials requires significant quantities of energy, sourced primarily from the direct combustion of fossil fuels and the electrical grid. This energy-intensive production has implications for climate change, due to Scope 1 GHG emissions from direct fossil fuel use. The regulatory implications of this were discussed earlier in the “Legislative and Regulatory Trends” and “Greenhouse Gas Emissions” sections. However, in addition to the industry’s direct GHG emissions, electricity purchases from the grid create environmental concerns, such as indirect impacts on the climate through Scope 2 emissions. Purchased electricity consumption, although unlikely to create direct regulatory risks for companies from Scope 2 GHG emissions, could have a material impact on company value through its impact on cost of production.

Construction materials companies also use alternative fuels for their kilns, such as scrap tires and waste oil—often waste generated by other industries. If properly managed, these can lower energy costs and GHG emissions. However, there could be potentially negative impacts, such as releases of harmful air pollutants that companies need to minimize in order to obtain net benefits from using such fuels.

Decisions about use of alternative fuels, renewable energy, and on-site generation of electricity (versus purchases from the grid) can play an important role in influencing both the costs and reliability of energy supply. Long-term prospects of increased energy demand from emerging markets, in addition to energy security, geopolitical, and climate change concerns, indicate upward pressure on the price, and limited availability, of conventional sources of energy. Affordable, easily accessible, and reliable energy is essential for competitive advantage in this industry, with purchased fuels and electricity accounting for a significant proportion of total production costs.

Regulatory actions are placing greater emphasis on resource conservation, and innovations in energy efficiency and alternative energy are providing new avenues for energy management. The way in which a construction materials company manages its overall energy efficiency, its reliance on different types of energy and associated sustainability risks, and its ability to access alternative sources of energy can influence its profitability.

Companies in the industry have made strides in reducing energy use largely through improved efficiency of operations. Much of these gains came from technological innovation and simple process optimization and equipment upgrades. Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Total energy consumed, percentage from purchased electricity, alternative sources, and renewable sources.

Evidence

The U.S. Energy Information Administration (EIA) recognizes the cement industry as the
most energy intensive of all manufacturing industries. The Agency explains that although the cement industry used only one-quarter of one percent of total U.S. energy in 2012, it is the most energy-intensive of all manufacturing industries, with a share of national energy use that is roughly 10 times its share of the nation’s gross output of goods and services. The average energy input to produce a ton of cement is 4.4 million BTU. According to the EPA, major sources of fuel energy in this segment include coal and coke (75 percent), natural gas (3 percent), and wastes (9 percent), while purchased electricity represents 11 percent of total energy used.

Other segments within the Construction Materials industry are also energy-intensive. Data from the EIA shows that glass manufacturing – which includes construction materials such as flat glass and fiberglass, among other uses – accounts for 1 percent of total industrial energy use in the U.S. Because glass has a low volume of shipments compared to other energy-intensive industries, the share of total industrial energy use seems low; however, energy consumption figures per unit of output show that the glass manufacturing segment’s energy intensiveness is similar to other energy-intensive industries at 13,140 BTU per 2005 dollar shipment. The main fuel energy sources used in this segment are natural gas (73 percent) and purchased electricity (23 percent).

According to 2011 data from the Annual Survey of Manufactures of the U.S. Census Bureau, the total cost of purchased fuels for the cement and concrete product manufacturing industry was approximately $1 billion and accounted for about 5 percent of the total cost of materials (for cement manufacturers alone, the ratio was 23 percent), compared to 1.6 percent for all manufacturing industries. The same data for the lime and gypsum product manufacturing industry was $671 million in purchased fuels, which represented 23 percent of the total cost of materials (42 percent for lime manufacturing and 13 percent for gypsum). Finally, figures for the glass product manufacturing segment were $821 million in purchased fuel costs, representing 8.7 percent of total costs of materials.

At the same time, the total cost of purchased electricity for the cement and concrete product manufacturing industry was more than $816 million, and made up 4.3 percent of the total cost of materials. Again, cement manufacturers accounted for the largest portion of electricity purchases: $527 million or almost 20 percent of the total cost of materials. Purchased electricity figures for the lime and gypsum product manufacturing and the glass product manufacturing segments were $207 million and $732 million, respectively. Both figures represent about 7 to 8 percent of total costs of materials.

At a company level, energy efficiency and alternative energy projects can garner considerable financial returns. A 2010 study by the Demand Response Research Center at the Lawrence Berkeley National Laboratory examined energy demand response at cement plants in the U.S. and potential implications for energy savings. Demand response programs can manage the
effects of variable energy prices due to demand fluctuations. Cement plants generally operate continuously for several months between shutdown periods. Intermediate products, such as clinker, can be stored for long periods of time, allowing for optimal production schedules that reduce demand on the grid during peak times. In addition, equipment upgrades such as replacing ball mills with vertical rolling mills could save 11-13 kWh per ton of cement.

In its 2012 Annual Results Presentation, China Resources Cement Holdings reported that the company had achieved almost 1 percent in year-on-year savings due to reduced electricity consumption. In absolute values, the total cost savings was approximately HK $117 million (around $15 million). Similarly, Lafarge reports using 17 percent of alternative fuels during its 2013 operations, of which 39 percent was biomass; Holcim reports that it generates 25 percent of its electrical needs from its own power plants, and that 13 percent is generated from renewable energy sources. Finally, 25 percent of energy supplied to CEMEX’s Mexican cement operations is provided by wind farms in the state of Oaxaca. This has helped the company avoid emitting approximately 582 thousand tons of total CO$_2$. Moreover, energy-efficient technologies in clinker production have enabled the company to reduce energy use by 40 percent in one of its UK facilities.

A relatively recent development in the Construction Materials industry is the increasing use of solid wastes as an alternative fuel input for kilns. This practice curbs waste-to-landfill volumes, but hazardous air emissions from waste could diminish the value of this development.

Innovations in energy efficiency and the push towards using renewable energy sources are likely to protect a company’s bottom line from fluctuating energy prices. Many companies in the Construction Materials industry recognize the risks of changing energy and electricity costs in their annual SEC filings. Martin Marietta Materials, for example, reports in its FY 2013 Form 10-K that in 2011, “increases in energy costs when compared with 2010 lowered net earnings for our businesses by $0.27 per diluted share”.

**Value Impact**

Energy management could have ongoing impacts on company value and operating costs given the industry’s energy intensity and rising energy costs, as well as one-time effects on cash flows through capital expenditures for energy-related projects.

In the face of rising costs of fossil fuels and electricity, construction materials companies that develop more energy-efficient methods of production can benefit from significant cost reductions and gain a competitive advantage.

As a significant portion of production costs for construction materials companies come from purchased electricity, decisions about on-site versus sourced electricity and diversification of energy sources can also influence the volatility and price of energy costs, and ultimately the risk profile and cost of capital of construction materials companies.

Given the industry’s energy intensity and rising energy costs, the probability and magnitude of impact is likely to increase in the near-term.
Water Management

While water has typically been a freely available and abundant commodity in many parts of the world, it is becoming a scarce resource due to increasing consumption from population growth and rapid urbanization, and potentially reduced supplies due to climate change. Furthermore, pollution can render water supplies expensive to treat or unusable. Based on recent trends, it is estimated that by 2025, important river basins in the U.S., Mexico, Western Europe, China, India, and Africa will face severe water problems as demand over-takes renewable supplies. Many important river basins can already be considered “stressed.” Water scarcity can result in higher supply costs and social tensions, for many companies across different sectors.88

Large volumes of water are required for aspects of construction materials production, including cooling cement and brick kilns, while actual water discharge from production plants is relatively low since closed-loop systems are in place and water is lost through evaporation. Evaporation generally accounts for the largest loss of water in the Construction Materials industry. Techniques such as using dry kilns instead of wet kilns in cement production can significantly reduce water consumption, when this switch is technically feasible. However, production in developing countries relies heavily on the older wet kiln technology.

Excessive water use in regions of high water stress can damage a company’s reputation and impact operational costs, particularly when competing with local communities and busi-

nesses for the resource. Companies that are unable to secure a stable water supply could face production disruptions, while rising water prices could directly increase production costs. Consequently, the adoption of technologies and processes that reduce water consumption could lower operating risks and costs for companies and create a competitive advantage. This could minimize the impact of regulations, water supply shortages, and community-related disruptions on company operations.

Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Freshwater withdrawals, percentage recycled, percentage in water-stressed regions.

Evidence

Despite significant reductions in water use in recent years, the Construction Materials industry is a water-intensive industry relative to others. Industry operations are ranked 22nd out of 130 GICS® sub-industries by water intensity.59

According to the EPA, in the cement and aggregates segment, clinker plants with wet kilns use between 23 to 130 gallons of water per ton of clinker, and 93 to 560 liters per ton of cement. As mentioned earlier, water consumption per ton of output in dry kilns is significantly lower at 16 gallons per ton of cement.50 While these figures show that water use per ton of output can vary greatly, depending on type of production and other factors, company-specific figures provide a better understand-

ing of the magnitude of water used. Holcim, the industry’s largest company, uses 244 liters of water per cubic meter of concrete, and 260 liters per ton of cement. Lafarge, the second largest cement and aggregates producer, reports that they use 284 liters of water to produce one cubic meter of concrete, and 343 liters to produce a ton of cement.

Moreover, water availability for construction materials companies may vary significantly from location to location across operations. For example, in their 2012 Sustainable Development Report, CEMEX provides a Relative Water Stress Index (WSI) for their operations that identifies 7 percent of the companies’ sites to be located in water-scarce areas, 2 percent in water-stressed areas, and 11 percent in regions with a medium access to water. Lafarge has estimated that 25 percent of its cement production facilities are in areas of water scarcity.

Water availability has direct impacts on operating costs. Faced with scarcity challenges, some companies are seeking innovative ways to recycle industrial water in order to reduce cost and improve accessibility. For example, when CEMEX faced rising water prices at one of its plants in Colombia, the company found an alternative source in wastewater from a nearby ice cream factory, which was discharging 7,000 cubic meters of treated wastewater into a nearby river. CEMEX agreed to buy the water from this company instead of paying high market prices. The company reduced its water bill by almost 85 percent from $3 per cubic meter to $0.5.

Furthermore, companies are collaborating with third parties to assess their water risks and improve their energy efficiency. Lafarge, for example, has partnered with WWF International and reports that 100 percent of its cement and aggregates sites have been assessed for water risk, using WWF’s Water Risk Filter. Similarly, the International Union for the Conservation of Nature is working with CEMEX to implement standardized water measurement and management across the business in order to reduce the firm’s water footprint.

Detailed disclosure around water risks is seldom found in SEC filings. However, some companies have started to identify these risks. Martin Marietta Materials, for example, mentions in its FY 2013 Form 10-K that severe droughts can restrict their access to water and, in turn, restrict production. Texas Industries provides similar disclosure informing its shareholders that changes in weather patterns could result in localized shortages of water and affect operations.

**Value Impact**

According to a JP Morgan report, risks associated with water management create three types of impacts on financial performance—higher costs, delayed growth, and higher cost of capital. Managing water consumption can influence operational risks faced by companies, with potentially acute impacts on value from disruptions to production. Water management can also affect ongoing operating costs and impact cash flows through one-off capital expenditures.

Water access is a long-term material concern for companies in the Construction Materials industry, given its important role in the manufacturing process. Water shortages are a problem in many regions of the world and are expected
to become a critical issue in several developing nations where the industry operates. Higher water prices or lack of availability directly affect operating costs. Limits on industrial water consumption could force producers to curb or cease production, potentially impacting market share and revenue growth.

Water intensity, particularly in regions with water scarcity, can lead to social and political unrest, and can impact a company’s reputation and its license to operate, increasing its risk profile and ultimately its cost of capital.

Water costs are gradually expected to rise across the globe as human consumption rises with higher standards of living, existing sources become unfit for use due to pollution, and climate change causes variations in precipitation patterns. Therefore, the probability and magnitude of the impact of water management is likely to increase in the near-term.

**Waste Management**

Due to high recycling rates within the Construction Materials industry, solid waste volumes are relatively low. However, local, state, and federal regulations that cover the capture and disposal of toxic dusts, sludge, spent fuels, and filtered air emissions are evolving and might pose a material risk to companies in the industry.

In the cement manufacturing segment, apart from other wastes, cement kiln dust (CKD) is of particular concern. According to the EPA, the tumbling and grinding of materials within a kiln produce a great deal of dust that consists mainly of ash and other tiny particles remaining from burnt limestone. In addition, CKD can contain metals and materials remaining from the hazardous wastes sometimes used as supplemental fuel within a kiln. CKD contains high concentrations of unreacted raw materials and is thus largely recycled back into production. However, some CKD is not fit for reuse and must be disposed of.

In other industry segments, proper waste management is also an important concern. In the gypsum product manufacturing segment, for example, environmental regulatory changes might affect companies’ operations. The EPA currently classifies synthetic gypsum as a non-hazardous waste, but after a highly publicized June 2008 coal ash spill, the EPA has proposed two alternative regulations that would address the storage and disposal of all coal combustion by-products, including gypsum.

As regulations evolve and there is increasing concern about the health impacts from industrial activities, companies that reduce waste streams—hazardous waste streams in particular—and recycle by-products, could lower regulatory and litigation risks and costs. Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Amount of waste from operations, percentage hazardous, and percentage recycled.
Evidence

In general, dust emissions from U.S. cement plants are regulated by the NSPS. The EPA limits particulate matter to 0.15kg per metric ton of dry kiln feed and 0.05 kg per metric ton of cooler exhaust gases. The EPA categorized CKD as a “special waste” and it is temporarily exempted from hazardous waste regulations under subtitle C of the RCRA. However, the EPA is currently working to establish rules dictating appropriate handling of CKD refuse.71

According to a Pollution Abatement Costs and Expenditures Survey published by the EPA in 2005, the total operating cost of pollution abatement for cement and concrete, lime and gypsum, flat glass, and clay building materials manufacturing was $455.5 million, from which 58 percent went to treatment, 20 percent to prevention, 7 percent to recycling, and 15 percent to disposal. Operating expenses related to the solid waste pollution abatement were $80.3 million or 17.6 percent of the total abatement operating costs. The total pollution abatement capital expenditures for the industry were $171.5 million, with approximately 17 percent of the expenditures related to solid waste abatement.72

Failure to manage waste disposal properly can create one-time expenses in the form of fines, and pose legal risks via lawsuits from those affected. Construction materials companies can incur significant costs associated with environmental remediation due to mismanagement of waste. For example, a San Francisco jury awarded Modesto, CA, a $100 million settlement from Vulcan Materials after ruling that the company contaminated local groundwater and soil with dry-cleaning solvents, including perchloroethylene (PCE).73

Value Impact

Companies that fail to reduce waste from their operations, or to deal with it appropriately when it is generated, are likely to face higher regulatory compliance costs and ongoing operational costs for waste-handling. Conversely, recycling solid wastes back into raw material inputs can save disposal and raw materials costs for materials producers.

Poor waste management practices can result in one-time costs and contingent liabilities associated with legal actions, as well as reputational damage, with impacts on brand value. This is of particular significance for hazardous wastes that are exempt under RCRA, where community concerns and negative impacts on the environment and the public can result in significant litigation costs or contingent liabilities and erosion of brand value.

Biodiversity Impacts

The extraction and processing of construction materials can impact the natural environment through contamination of water, air, and land. In addition, surface mining and mountain top removal have a range of social and environmental consequences, including altering the landscape, removing vegetation and wildlife habitats, and disrupting local communities.

Construction materials companies involved in production of aggregates, cement, bricks, glass, and gypsum often operate their own quarries close to processing facilities. Quarrying requires the removal of vegetation and topsoil (overburden) and subsequent blasting and crushing of underlying stone deposits. It is in-
herently a destructive process that usually leads to permanent alterations of the landscape.

As mentioned earlier (see “Legislative and Regulatory Trends” section), the SMCRA establishes mining, environmental protection and reclamation standards for surface and underground mining. Mine operators must obtain SMCRA permits and permit renewals for mining operations. In addition, U.S. states require defunct mined property to be restored to specific standards according to prior-approved reclamation plans, including removing or burying refuse piles, water treatment obligations, and dismantling facilities and roadway infrastructure. These obligations can result in significant costs to construction material companies with quarrying operations. Due to the scale of operations, fines for regulatory non-compliance are a fairly common occurrence despite attempts to control ecological impacts.

Evidence

Members of the WBCSD’s Cement Sustainability Initiative recognize their responsibility for rehabilitation of quarry and processing plant sites following their closure. In 2005, the organization produced guidelines for an Environmental and Social Impact Assessment process for companies to use in the evaluation of their projects. Companies aware of the importance of this issue have taken voluntary measures to minimize risks to biodiversity and their operations; including determining the share of operations near areas of local biodiversity sensitivity. In 2013, Lafarge determined that 20 percent of its active quarries were situated near ecologically sensitive areas, as determined by the WWF. The company has collaborated with the WWF over the past few years to develop biodiversity management plans and now reports that 37 percent of these quarries have implemented such plans. Similarly, CEMEX reports that the percentage of active sites with quarry rehabilitation plans went up to 92 percent.
in 2013 from 89 percent in 2011, and the percentage of active sites with high biodiversity value where biodiversity action plans are implemented has increased from 38 to 51 percent over the same timeframe. The company expects to achieve a 100 percent performance on all the indicators by 2015.\textsuperscript{76}

In fact, as concerns over ecological impacts have grown in the past decade, additional areas have been designated as protected under new or existing laws, increasing risks to company operations. From 1990 to 2010, global protected area coverage increased from 8.8 percent to 12.7 percent on land, and from 0.9 percent to 4 percent in marine areas under national jurisdiction.\textsuperscript{77}

Construction materials companies can incur significant costs associated with environmental remediation if biodiversity management plans fail and ecological accidents happen. In 2010, Torromeo Industries, a private gravel and cement producer, was fined $875,000 by the EPA for violating the CWA. The company illegally filled in a wetland area with gravel and cement refuse and dumped process water into wetlands and waterways without a permit. The settlement required the company to restore 13 acres of wetlands.\textsuperscript{78}

Perhaps more importantly, biodiversity considerations are an important factor in a company’s proven and probable reserves estimates. As Vulcan Materials reports in its FY 2013 Form 10-K, “technical and economic factors also affect the estimates of reported reserves regardless of what might otherwise be considered proven or probable based on a geologic analysis. For example, excessive overburden or weathered rock, rock quality issues, excessive mining depths, groundwater issues, overlying wetlands, endangered species habitats, and rights of way or easements may effectively limit the quantity of reserves considered proven and probable.”\textsuperscript{79}

**Value Impact**

Proper management of biodiversity impacts becomes fundamental for creating true reserve estimates, acquiring new permits and managing growth. Poor management of this issue can result in higher regulatory compliance costs and disruptions to permitting may occur when ecological impacts are not carefully addressed, leading to delays, additional costs and lost revenue.

Conversely, active management of biodiversity impacts—through the introduction of biodiversity and land management programs—can help companies gain easier access to new projects and new sources of revenue. Biodiversity impacts, to the extent that they impact local communities, can lead to significant one-time costs and contingent liabilities associated with legal actions, as well as impacts on a company’s reputation and brand value.
SOCIAL CAPITAL

Social capital relates to the perceived role of business in society, or the expectation of business contribution to society in return for its license to operate. It addresses the management of relationships with key outside stakeholders, such as customers, local communities, the public, and the government. Social capital, broadly, includes issues around local community engagement, access to products and services, affordability, responsible business practices in marketing, and customer privacy.

The Construction Materials industry can affect communities in which they are located through air pollution, water consumption that exacerbates regional stresses, waste generation, and impacts on land value and biodiversity. Community impacts can hurt a company's social license to operate affecting brand value. As a result of public pressure, companies may find it difficult to gain regulatory approvals for expanding operations, or may face more stringent regulations. Companies could also have legal liabilities related to their community impacts. These impacts are addressed by the disclosure topics of “Air Quality,” “Water Management,” “Waste Management” as well as “Biodiversity Impacts.”

HUMAN CAPITAL

Human capital addresses the management of a company’s human resources (employees and individual contractors), as a key asset to delivering long-term value. It includes factors that affect the productivity of employees, such as employee engagement, diversity, and incentives and compensation, as well as the attraction and retention of employees in highly competitive or constrained markets for specific talent, skills, or education. It also addresses the management of labor relations in industries that rely on economies of scale and compete on the price of products and services. Lastly, it includes the management of the health and safety of employees and the ability to create a culture of safety for companies that operate in dangerous working environments.

Worker health and safety are important considerations for construction materials producers due to inherent dangers in manufacturing. Investments in strong safety programs, employee training, and modern equipment can reduce the risk of safety-related accidents and associated costs.

Workforce Health, Safety, and Well-being

The Construction Materials industry employs millions of employees and contractors worldwide; publicly traded companies alone directly employ more than 2 million people across the globe. Resource extraction activities inherent to some segments of the industry, plus industrial processes used in the manufacturing of finished building products can present significant risks to employees working at industry quarries and facilities.

In the U.S., the industry is regulated by the Mine Safety and Health Administration and
OSHA. While accident rates in the Construction Materials industry are on a long-term decline, worker injury can lead to negative publicity, low worker morale, and increased healthcare and injury compensation costs. Moreover, OSHA usually levies fines against U.S. operators for non-compliance of worker health and safety standards and preventable accidents.

Inhalation of dust containing silica and other abrasives is a common health concern at many cement and aggregate facilities. Both U.S. regulators have established occupation thresholds for crystalline silica exposure as respirable dust. Exposure to cement dust can irritate eyes, nose, throat, and the upper respiratory system. Skin contact may result in moderate irritation to thickening and cracking of skin to severe skin damage from chemical burns. Silica exposure can lead to lung injuries including silicosis, which can be severely debilitating and even fatal in some cases if untreated, and lung cancer.

Companies in the industry recognize the importance to long-term value of maintaining high standards of health and safety despite pressures to reduce costs in order to protect profitability. Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Injury and near-miss frequency rates for full-time and contract employees; and
- Number of reported cases of silicosis.

Evidence

According to data from the Bureau of Labor Statistics for 2012, there were 32 fatal occupational injuries in the non-metallic mineral product manufacturing industry and another 16 in the non-metallic mineral mining and quarrying industry. The majority of them (22) were attributable to cement and concrete product manufacturing activities, and to a lesser extent to construction sand and gravel mining (7), and glass and glass product manufacturing (3).

The number of cases of fatal injuries is relatively higher for this industry; in fact, 2012 figures are higher than industries involved in other resource extraction activities - such as oil and gas extraction (26), coal mining (20) – and other heavy manufacturing – such as petroleum and coal products (14), primary metal manufacturing (24) and chemical manufacturing (24).

Data for non-fatal occupational injuries is also relatively high for the industry. In 2012, the rate of injury and illness cases per 100 full-time employees was 5.1 and 2.3 for the industry’s product manufacturing, and mining and quarrying activities, respectively. In comparison, other resource extraction and heavy manufacturing industries recorded the following rates: oil and gas extraction (2.1), coal mining (3.6), petroleum and coal product manufacturing (1.5), primary metal manufacturing (6.2) and chemical manufacturing (2.3).

Many companies put employee and contractor safety as a priority and strive to reduce injuries and fatalities at the workplace. For example, CEMEX created the Global Cement Opera-

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10 The Bureau of Labor Statistics uses the North American Industry Classification System (NACIS). The Non-Metallic mineral product manufacturing industry includes the following segments: clay products manufacturing, glass and glass product manufacturing, cement and concrete product manufacturing, and lime and gypsum product manufacturing. The non-metallic mineral mining and quarrying industry includes the following segments: stone mining and quarrying, sand, gravel, clay, and ceramic minerals; and other nonmetallic minerals.
tions Safety Taskforce with the goal to mitigate incidents related to maintenance activities and eliminate fatalities at operations. The company’s Lost-time Injury (LTI) Frequency Rate was down 15 percent from 2 to 1.7 employees per million hours worked. In 2013, the company recorded 171 LTIs of employees and 90 of contractors.  

Information about employee health and safety is typically provided via sustainability reports, such as the CEMEX case above, but some companies in the industry have started providing similar information in their SEC filings. Owens Corning, for example, discusses progress on its Recordable Incident Rates (RIR) in its FY 2012 Form 10-K. The company mentions that its strong safety culture has resulted in a 95 percent reduction in its RIR since 2001; perhaps more interestingly, the company acknowledges the potential financial impact of its safety initiatives: “our organization-wide expectation [on safety] provides for a safer work environment for employees, improves our manufacturing processes, reduces our costs and enhances our reputation.”

Non-compliance with OSHA standards, or other health and safety regulators in other jurisdictions, can create regulatory penalties for companies, as well as additional operating costs for achieving compliance. In addition, mismanagement of health and safety issues can also lead to lawsuits from those injured or their families. In evidence, in 2012 one of the top global cement manufacturers was fined more than $200,000 for breaching sections of the UK Health and Safety at Work Act of 1974 when an employee was burned in an electrical fire caused by improper management of electrical equipment. While one-time fines such as these might seem low, higher-than-average rates of fatal and non-fatal injuries in the industry might erode shareholder value over the medium- to long-term.

**Value Impact**

In an industry with higher than average fatality rates, poor health and safety records can increase regulatory compliance costs from more stringent oversight. In addition, a company’s health and safety record can affect its insurance premiums and therefore, operating costs. Health and safety incidents can also result in downtime or operations at reduced capacity, and ultimately a loss of revenue-generating opportunities. Ultimately, it can lead to chronic impacts on company value due to lower employee morale and productivity, and can impact a company’s reputation and brand value. Serious incidents with low probability of occurrence, but high potential magnitude of impacts can lead to acute, one-time costs and contingent liabilities from legal action or regulatory penalties.

**BUSINESS MODEL & INNOVATION**

This dimension of sustainability is concerned with the impact of environmental and social factors on innovation and business models. It addresses the integration of environmental and social factors in the value creation process of companies, including resource efficiency and other innovation in the production process. It also includes product innovation and efficiency.
and responsibility in the design, use-phase, and disposal of products. It includes management of environmental and social impacts on tangible and financial assets—either a company’s own or those it manages as the fiduciary for others.

Construction materials companies are increasingly facing customers with preferences for products that assist them in obtaining LEED certifications. As a result, there is increased demand for products, systems and services that contribute to building sustainable spaces. In this context, companies that focus research and development efforts in product innovations that minimize the lifecycle impact of their materials could enjoy a strong competitive position over the long-term.

Product Innovation

Over much of the past decade, environmental concerns have shed light on the importance of developing and using sustainable materials for the construction of homes, buildings and structures. Building construction uses large quantities of natural resources; in fact, according to the EPA, construction activities use 60 percent of the raw materials (other than food and fuel) used in the entire U.S. economy. These materials include iron and steel products, fixtures, doors, and cabinetry, as well as products manufactured by the Construction Materials industry, such as cement, concrete, bricks, tiles, drywall, wallboards, glass, insulation products, and shingles and coating materials. Apart from being resource-intensive, once constructed, buildings are also a major source of greenhouse gases. The EPA estimates that in 2012, direct GHG emissions from homes and businesses accounted for approximately 10 percent of total U.S. GHG emissions.

Key market and regulatory trends are contributing to the growth of the green building market and, in the process, are creating opportunities for construction material companies that can innovate and manufacture products that minimize impacts on the environment and human health during their lifecycle.

Real estate developers and construction, engineering and architecture firms are increasingly seeking green building certification for their projects. According to the USGBC, every day more than 1.5 million square feet of space is certified using LEED. In December 2013, the organization announced that it had issued its 20,000th LEED certification since its creation in 1993. The organization reports that more than 56,000 commercial and institutional projects, comprising 10.5 billion square feet of construction space worldwide, and more than 47,000 residential units currently participate in LEED.

In addition, increased national, state and local regulatory concerns over the environmental and health impacts of buildings have spurred the creation of new building codes that promote the use of energy-efficient products and sustainable materials. Tax subsidies and operating costs savings have supported this trend. Several governments, including in the U.S., have used financial incentives to encourage the use of sustainable construction materials and energy-efficient designs and appliances. As these credits increase in value, the incentive to use these materials increases as well.
The benefits of the construction of green buildings are plentiful and include positive environmental outcomes, such as resource savings, energy efficiency, water conservation, and greenhouse gas mitigation, as well as social benefits such as reduced negative impacts on human health. Construction materials companies that invest in technological advances to bank on these trends are likely to gain a competitive advantage over their peers as the industry continues to be pressured by regulatory and market forces and as their customers continue to seek green building certification.

Company performance in this area can be analyzed in a cost-beneficial way, internally and externally, through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Percentage of products that can be used for credits in sustainable building design and construction certifications; and
- Total addressable market and share of market for products that reduce environmental impacts during usage and/or production.

**Evidence**

According to a report from Navigant Research, the global market for green construction materials is expected to grow from $116 billion in 2013 to more than $254 billion in 2020, with Europe accounting for about 50 percent of the market.91 Increasing demand for construction materials aimed at improving resource efficiency of buildings is also supported by a survey of construction companies from McGraw-Hill Construction. The survey found that 51 percent of respondents reported that they expected more than 60 percent of their work to be green by 2015. This figure represents an increase from the 28 and 13 percent of companies that said the same for their work in 2013 and 2008, respectively.92

In the U.S., revenue for the sustainable building material manufacturing industry is expected to increase at an average annual rate of 21 percent to total $31 billion by 2014.93 Moreover, during the next five years, the industry is expected to continue expanding with revenue forecasts increasing at an average annual rate of 11.5 percent to $54 billion. In particular, local demand has increased for sustainable floorcovering products, precast concrete products that use recycled materials (such as ash from power furnaces), energy-efficient windows, doors and roofs; cement-free concrete; and structural building components made with high recycled material content, such as gypsum and cellulose insulation.94

Construction materials companies have quickly adapted to rising demand for sustainable products. Companies in the cement and aggregates segment provide multiple examples of products that address impacts on water, greenhouse gas emissions and waste. Vulcan Materials, for example, has introduced a line of sustainable aggregates products that enable customers to gain LEED credits; one such innovation is a water-permeable paving material designed to improve natural drainage. CEMEX has a portfolio of nine technology offers that address environmental concerns. For example, the company developed a product to reduce the environmental impact of vertical concrete wall...
systems; each home built with their product, the company says, reduces building emissions by a total of 170 metric tons of CO$_2$ over the course of 30 years.\textsuperscript{95}

Finally, Ceratech, a Virginia-based cement private company, is using fly ash waste from coal-burning power plants as an input in their production process. By using 95 percent fly ash and 5 percent liquid inputs, Ceratech eliminates the need to produce clinker in traditional cement kilns. According to the company, the cement is carbon-neutral, and in a three-story, 4,600-square-meter building, would divert 374 tons of fly ash from landfill and reduce carbon dioxide emissions by 320 tons, steel reinforcing bars by 34 tons, and concrete use by 183 cubic meters.\textsuperscript{96}

Companies operating in other industry segments have also adapted to the rising demand in sustainable construction materials. Owens Corning, for example, developed EcoTouch insulation, which is formaldehyde-free, contains at least 58 percent recycled glass content, and contains a minimum of 99 percent plant- and mineral-based compounds.\textsuperscript{97} USG Corp has a portfolio of 12 acoustical ceiling panels that improve a buildings’ environmental performance and contribute toward healthier living and working spaces. The company provides environmental product declarations that detail their products’ lifecycle impacts on the atmosphere, water and other resources.

Several companies in the industry have started to recognize the materiality of this issue in their SEC filings. For example, in its FY 2013 Form 10-K, USG Corp states that it expects “increased demand over time for products (…) that meet regulatory and customer sustainability standards and preferences and decreased demand for products that produce significant greenhouse gas emissions.”\textsuperscript{98} Furthermore, the company states that its ability to navigate these changes in customer preferences and continue to provide sustainable construction materials will be important in maintaining a competitive position in the future. In a similar fashion, U.S. Concrete states in its FY 2013 Form 10-K Form that its green building product technology creates competitive advantages over smaller concrete producers and larger vertically integrated aggregates and cement companies that do not focus on this type of products as a first solution; the company goes on to say that it is well-positioned to take advantage of the growing demand for sustainable products with potential positive impacts on revenues, profits, and operating margins.

**Value Impact**

Sustainable construction materials are becoming a key market for the industry, driving competitive advantage and long-term revenue growth through higher increased market share and pricing power. Companies who are able to take advantage of emerging trends may gain a competitive advantage over their rivals, improving their conditions for cost of capital. Moreover, initiatives to develop sustainable building materials are likely to impact research and development expenses. Sustainable products can also lead to lower costs to the extent that production incorporates recycled raw materials.
Given increasing consumer demand for sustainable construction materials, the probability and magnitude of impact on financial results is likely to increase in the near-term.

**LEADERSHIP AND GOVERNANCE**

As applied to sustainability, governance involves the management of issues that are inherent to the business model or common practices in the industry and that are in potential conflict with the interest of broader stakeholder groups (government, community, customers, and employees), and therefore create a potential liability, or worse, a limitation or removal of license to operate. This includes regulatory compliance, lobbying, and political contributions. It includes risk management, safety management, supply chain and resource management, conflict of interest, anti-competitive behavior, and corruption and bribery.

In the Construction Materials industry, governance issues arise from the relative lack of transparency in the pricing of some construction materials, which can in turn create the potential for market manipulation with an impact on customers and businesses.

**Pricing Integrity & Transparency**

The potential for market manipulation practices exists when market power is concentrated in the hands of a few players. Antitrust practices include measures to obtain or maintain market domination by reducing competition; such practices may harm the public by limiting choice, increasing prices, and stifling innovation. Antitrust regulations, such as the Sherman Act in the U.S., seek to maintain a competitive environment in order to provide consumers with the benefit of lower prices, high quality products and services, more choices, and greater innovation.

Several factors make the Construction Materials industry prone to antitrust risks. First, as described in the Industry Summary section, some segments within the industry, in particular the cement and aggregates segment, are in the process of global consolidation. This segment is already characterized by a handful of dominant companies, and planned mergers – such as the one between Holcim and Lafarge – will likely increase the market power of some companies in both global and regional markets. Second, barriers to entry are relatively high due to high capital expenditure requirements needed in order to extract and process raw materials. Third, the lack of close substitutes and a growing demand for cement and cement-based products to fuel the development of world infrastructure, give companies in the industry relative power over their customers.

Company performance in this area can be analyzed in a cost-beneficial way internally and externally through the following direct or indirect performance metrics (see Appendix III for metrics with their full detail):

- Amount of legal and regulatory fines and settlements associated with cartel activities, price fixing, and anti-trust activities.

**Evidence**

In late 2012, USG Corp and seven other manufacturers of drywall products, including Nation-
al Gypsum and Lafarge North America, were named as defendants in a class-action lawsuit alleging that since September 2011, they conspired to fix and raise the price of gypsum wallboard sold in the U.S. market. USG Corp mentions in its FY 2013 Form 10-K that the lawsuit is still in its preliminary stages while also informing its shareholders that similar lawsuits have been filed in Canadian courts on behalf of purchases of the same product in Canada.

Examples of market manipulation lawsuits and investigations in other jurisdictions are also available. For example, in 2008 and 2009, the EU Commission carried out unannounced inspections in eight Member States at the premises of cement and aggregate companies. Such inspections led to the opening of antitrust proceedings against eight cement manufacturers, including Holcim, Lafarge, HeidelbergCement and CEMEX, among others, on the grounds of market sharing and price coordination. The final ruling is still pending as several companies unsuccessfully appealed the Commission's request for information to investigate the alleged infringement.

The cement and aggregates segment is not the only one that has been under investigation by the EU Commission. In November 2007, the European body imposed fines totaling almost €490 million euro on four flat glass producers, including Saint-Gobain (France) and Asahi Glass (Japan), alongside Guardian Industries (U.S.) and Pilkington (U.K.), who together controlled 80 percent of the flat glass market in the European Economic Area, organized several rounds of price increases and fixed minimum prices and other commercial conditions in an attempt to manipulate the market.

Fines for market manipulation practices have also been levied in emerging countries, where the bulk of the industry’s growth is coming from. In May 2014, for example, Brazil’s anti-trust watchdog, Cade, fined Holcim Ltd. and Cimpor Cimentos de Portugal, among four other Brazilian cement manufacturers, a total of $1.4 billion for alleged price-rigging over a two-decade timespan. Moreover, the companies were ordered to dispose of certain assets, including cross-shareholdings and to cut installed capacity in concrete services by 20 percent in large markets. Cade estimates that as a result of the collusion, Brazil was losing 1.4 billion reais annually while the companies were controlling 85 percent of the nation’s cement market and forcing competitors out of the market by setting agreed prices.

Moreover, antitrust authorities in the U.S. and abroad are becoming cautious about the implications of mergers and acquisitions to consumers and industry competitors. In April 2014, Holcim and Lafarge, the two largest cement manufacturers, agreed to form the world’s largest cement maker when they announced plans to merge. The merger plan includes selling assets with $6.9 billion in revenues in order to win regulatory approvals from 15 antitrust authorities, including those in the U.S. and other countries, such as Canada, Brazil, India and China. If the merger is approved, the
combined group would account for $40 billion in annual revenue\textsuperscript{105}, which is twice as much as the third largest cement maker, CNBM of China. Several antitrust authorities, including the EU Commission have already expressed their concern that a merger may harm consumers by increases in prices and reduced competition.\textsuperscript{106}

**Value Impact**

Companies’ ability to manage the changing legal and regulatory environment, as well as their ability to ensure their operations are competitive, could have both acute and chronic impacts on value. Acute impacts could arise from major regulatory sanctions in the form of extraordinary expenses and contingent liabilities to compensate third parties. Such rulings may also impose limits on companies’ ability to charge higher prices and restrict their license to operate in certain markets, with dual impacts on revenue in terms of market share and pricing.

Over the long-term, repeated violations — whether resulting in minor or significant regulatory penalties at the time — could affect a company’s reputation. This chronic effect could restrict a company’s ability to gain regulatory approvals and expand operations, limiting its long-term revenue growth potential, and raising its risk profile, and therefore, cost of capital.
APPENDIX I: Five Representative Companies | Construction Materials

<table>
<thead>
<tr>
<th>COMPANY NAME (TICKER SYMBOL)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CRH PLC – ADR (CRH)</td>
<td></td>
</tr>
<tr>
<td>CEMEX – SP ADR (CX)</td>
<td></td>
</tr>
<tr>
<td>Vulcan Materials (VMC)</td>
<td></td>
</tr>
<tr>
<td>Owens Corning (OC)</td>
<td></td>
</tr>
<tr>
<td>USG Corp (USG)</td>
<td></td>
</tr>
</tbody>
</table>

This list includes five companies representative of the Construction Materials industry and its activities. This includes only companies for which the Construction Materials industry is the primary industry; companies that are U.S.-listed, but are not primarily traded Over-the-Counter; and where at least 20 percent of revenue is generated by activities in this industry, according to the latest information available on Bloomberg Professional Services. Retrieved on June 20, 2014.
APPENDIX IIA: Evidence for Sustainability Disclosure Topic

<table>
<thead>
<tr>
<th>Sustainability Disclosure Topics</th>
<th>EVIDENCE OF INTEREST</th>
<th>EVIDENCE OF FINANCIAL IMPACT</th>
<th>FORWARD-LOOKING IMPACT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HM (1-100)</td>
<td>IWGs</td>
<td>EI</td>
</tr>
<tr>
<td>Greenhouse Gas Emissions</td>
<td>40*</td>
<td>100</td>
<td>2</td>
</tr>
<tr>
<td>Air Quality</td>
<td>40*</td>
<td>100</td>
<td>5</td>
</tr>
<tr>
<td>Energy Management</td>
<td>60*</td>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>Water Management</td>
<td>35</td>
<td>100</td>
<td>3</td>
</tr>
<tr>
<td>Waste Management</td>
<td>50*</td>
<td>92</td>
<td>7</td>
</tr>
<tr>
<td>Biodiversity Impacts</td>
<td>45*</td>
<td>85</td>
<td>8</td>
</tr>
<tr>
<td>Workforce Health, Safety, and Well-being</td>
<td>70*</td>
<td>92</td>
<td>4</td>
</tr>
<tr>
<td>Product Innovation</td>
<td>50*</td>
<td>92</td>
<td>6</td>
</tr>
<tr>
<td>Pricing Integrity &amp; Transparency</td>
<td>50*</td>
<td>85</td>
<td>9</td>
</tr>
</tbody>
</table>

HM: Heat Map, a score out of 100 indicating the relative importance of the topic among SASB’s initial list of 43 generic sustainability issues; asterisks indicate “top issues.” The score is based on the frequency of relevant keywords in documents (i.e., 10-Ks, shareholder resolutions, legal news, news articles, and corporate sustainability reports) that are available on the Bloomberg terminal for the industry’s publicly-listed companies; issues for which keyword frequency is in the top quartile are “top issues.”

IWGs: SASB Industry Working Groups

%: The percentage of IWG participants that found the disclosure topic to likely constitute material information for companies in the industry. (−) denotes that the issue was added after the IWG was convened.

Priority: Average ranking of the issue in terms of importance. One denotes the most important issue. (−) denotes that the issue was added after the IWG was convened.

EI: Evidence of Interest, a subjective assessment based on quantitative and qualitative findings.

EFI: Evidence of Financial Impact, a subjective assessment based on quantitative and qualitative findings.

FLI: Forward Looking Impact, a subjective assessment on the presence of a material forward-looking impact.
## APPENDIX IIB:
**Evidence of Financial Impact for Sustainability Disclosure Topics**

<table>
<thead>
<tr>
<th>Evidence of Financial Impact</th>
<th>Revenue</th>
<th>Operating Expenses</th>
<th>Non-operating Expenses</th>
<th>Assets</th>
<th>Liabilities</th>
<th>Cost of Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse Gas Emissions</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Air Quality</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Energy Management</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Water Management</td>
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<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Waste Management</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Biodiversity Impacts</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Workforce Health, Safety, and Well-being</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Product Innovation</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Pricing Integrity &amp; Transparency</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>

- **HIGH IMPACT**
- **MEDIUM IMPACT**
### APPENDIX III: Sustainability Accounting Metrics | Construction Materials

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>ACCOUNTING METRIC</th>
<th>CATEGORY</th>
<th>UNIT OF MEASURE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Greenhouse Gas Emissions</strong></td>
<td>Gross global Scope 1 emissions, percentage covered under a regulatory program</td>
<td>Quantitative</td>
<td>Metric tons CO₂-e, Percentage (%)</td>
<td>NR0401-01</td>
</tr>
<tr>
<td></td>
<td>Description of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets</td>
<td>Discussion and Analysis</td>
<td>n/a</td>
<td>NR0401-02</td>
</tr>
<tr>
<td><strong>Air Quality</strong></td>
<td>Air emissions for the following pollutants: NOₓ (excluding N₂O), SO₂, particulate matter (PM), dioxins/furans, volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and heavy metals</td>
<td>Quantitative</td>
<td>Metric tons (t)</td>
<td>NR0401-03</td>
</tr>
<tr>
<td><strong>Energy Management</strong></td>
<td>Total energy consumed, percentage from: (1) purchased electricity, (2) alternative sources, (3) renewable sources</td>
<td>Quantitative</td>
<td>Gigajoules (GJ), Percentage (%)</td>
<td>NR0401-04</td>
</tr>
<tr>
<td><strong>Water Management</strong></td>
<td>Total fresh water withdrawn, percentage recycled, percentage in regions with High or Extremely High Baseline Water Stress</td>
<td>Quantitative</td>
<td>Cubic meters (m³), Percentage (%)</td>
<td>NR0401-05</td>
</tr>
<tr>
<td><strong>Waste Management</strong></td>
<td>Amount of waste from operations, percentage hazardous, percentage recycled</td>
<td>Quantitative</td>
<td>Metric tons (t), Percentage (%)</td>
<td>NR0401-06</td>
</tr>
<tr>
<td><strong>Biodiversity Impacts</strong></td>
<td>Description of environmental management policies and practices for active sites</td>
<td>Discussion and Analysis</td>
<td>n/a</td>
<td>NR0401-07</td>
</tr>
<tr>
<td></td>
<td>Terrestrial acreage disturbed, percentage of impacted area restored</td>
<td>Quantitative</td>
<td>Acres, Percentage (%)</td>
<td>NR0401-08</td>
</tr>
<tr>
<td><strong>Workforce Health, Safety &amp; Well-Being</strong></td>
<td>(1) Total Recordable Injury Rate (TRIR) and (2) Near Miss Frequency Rate for (a) full-time employees and (b) contract employees</td>
<td>Quantitative</td>
<td>Rate</td>
<td>NR0401-09</td>
</tr>
<tr>
<td></td>
<td>Number of reported cases of silicosis⁶⁵</td>
<td>Quantitative</td>
<td>Number</td>
<td>NR0401-10</td>
</tr>
</tbody>
</table>

⁶⁵ Note to NR0401-10 – Disclosure shall include a discussion of efforts to minimize workers’ exposure to crystalline silica.
### APPENDIX III: Sustainability Accounting Metrics | Construction Materials (cont.)

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>ACCOUNTING METRIC</th>
<th>CATEGORY</th>
<th>UNIT OF MEASURE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Innovation</strong></td>
<td>Percentage of products that can be used for credits in sustainable building design and construction certifications</td>
<td>Quantitative</td>
<td>Percentage (%) by annual sales revenue</td>
<td>NR0401-11</td>
</tr>
<tr>
<td></td>
<td>Total addressable market and share of market for products that reduce energy, water, and/or material impacts during usage and/or production</td>
<td>Quantitative</td>
<td>U.S. Dollars ($), Percentage (%)</td>
<td>NR0401-12</td>
</tr>
<tr>
<td><strong>Pricing Integrity &amp; Transparency</strong></td>
<td>Amount of legal and regulatory fines and settlements associated with cartel activities, price fixing, and anti-trust activities(^{91})</td>
<td>Quantitative</td>
<td>U.S. Dollars ($)</td>
<td>NR0401-13</td>
</tr>
</tbody>
</table>

\(^{91}\) Note to NR0401-13 – Disclosure shall include a description of fines and settlements and corrective actions implemented in response to events.
APPENDIX IV: Analysis of 10-K Disclosures | Construction Materials

The following graph demonstrates an aggregate assessment of how the top ten U.S.-domiciled Construction Materials companies, by revenue, are currently reporting on sustainability topics in the Form 10-K.

**TYPE OF DISCLOSURE ON SUSTAINABILITY TOPICS**

**Construction Materials**

<table>
<thead>
<tr>
<th>Topic</th>
<th>NO DISCLOSURE</th>
<th>BOILERPLATE</th>
<th>INDUSTRY-SPECIFIC</th>
<th>METRICS</th>
<th>IWG Feedback*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse Gas Emissions</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Air Quality</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Energy Management</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Water Management</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Waste Management</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Biodiversity Impacts</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Workforce Health, Safety, and Well-being</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Product Innovation</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Pricing Integritry &amp; Transparency</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
<td>30%</td>
<td>40%</td>
</tr>
</tbody>
</table>

*Percentage of IWG participants that agreed topic was likely to constitute material information for companies in the industry.
References

1 Data from Bloomberg Professional service using ICS <GO> command. The data represents global revenue numbers of companies listed on global exchanges, or traded over-the-counter, from the Construction Materials industry, using the Levels 2 and 3 Bloomberg Industry Classification System. The calculation excludes Wood Building Products. Accessed June 12, 2014.

2 Ibid.

3 Ibid.


5 Ibid.


9 Vulcan Materials Inc. 2012 Form 10-K.


23 Ibid.


25 Ibid.


33 Ibid. Page 8.


References (cont.)


46 Ibid.


48 Ibid.

49 Ibid.


54 CEMEX: 2013 sustainable development report. Page 34.


59 MSCI ESG Issue Report: Water: Upstream and Downstream Impacts from a Well Running Dry –Executive Summary, September 2013, Figure 2.


References (cont.)


80. Data from Bloomberg Professional service using EQS <GO> command. The data represents total employees for FY 2013 for companies listed on global exchanges, or traded over-the-counter, from the Construction Materials industry, using the Levels 2 and 3 Bloomberg Industry Classification System. The calculation excludes Wood Building Products. Accessed June 18, 2014.


83. Ibid.

84. Ibid.


86. Owens Corning. Form 10-K for fiscal year 2012.


90. Ibid.


94. Ibid.


98. USG Corp. Form 10-K for fiscal year 2013. Page 5.


References (cont.)


105 Ibid.
